

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Application No.: 10/572,668
Applicant: Daniele FAUROUX
Filed Internationally: September 21, 2004
US National: March 20, 2006
Title: METHOD AND INSTALLATION FOR PRODUCING CARBON
MONOXIDE BY CRYOGENIC DISTILLATION
TC/A.U: 1621
Examiner: Jafar F. Parsa
Docket No.: Serie 6373
Customer No.: 40582

APPEAL BRIEF

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Applicant submits this Appeal Brief to the Board of Patent Appeals and Interferences on appeal from the decision of the Examiner of Group Art Unit 1724 dated April 15, 2008, finally rejecting claims 9-12. The final rejection of claims 9-12 is appealed. This Appeal Brief is believed to be timely since as set by the mailing of a Notice of Appeal on June 16, 2008. Please charge the fee of **\$510.00** for filing this brief to Deposit Account No. 01-1375, Attorney Docket No. Serie 6373.

The Commissioner is hereby authorized to charge any appropriate fees under 37 C.F.R. §§ 1.16, 1.17 and 1.21 that may be required by this paper and to credit any overpayment to Deposit Account No. 01-1375.

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Real Party in Interest

The present application has been assigned to L'Air Liquide, Société Anonyme à Directoire et Conseil de Surveillance pour l'Etude et l'Exploitation des Procédés Georges Claude, Paris, France. No other entity has an interest in the present application or appeal.

Related Appeals and Interferences

Applicant asserts that no other appeals or interferences are known to the Applicant, the Applicant's legal representative, or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

Status of Claims

Claims 9-12 are pending in the application. Claims 1-8 were originally presented in the application and were cancelled with a preliminary amendment. Claims 9-16 were added in a preliminary amendment. Claims 13-16 have been withdrawn from consideration. Claims 9-12 stand finally rejected as discussed below. The final rejection of claims 9-12 are appealed. The pending claims are shown in the attached Claims Appendix.

Status of Amendments

All claim amendments have been entered by the Examiner. No amendments were proposed after the final rejection.

Summary of Claimed Subject Matter

This invention relates to a method directed to producing carbon monoxide by cryogenic distillation. *See Application*, page 1, lines 5 – 7.

A. Claim 9 - INDEPENDENT

Claim 9 recites a method for producing carbon monoxide by cryogenic distillation. *See Application*, page 1, lines 5 – 7. As claimed, this method includes cooling and partially condensing a gas mixture containing carbon monoxide, hydrogen and nitrogen, to produce a cooled and partially condensed gas mixture. *See Application*, page 1, lines 26-28. As claimed, this method includes separating this cooled and partially condensed gas mixture to produce a hydrogen-enriched gas and a carbon monoxide-enriched liquid. *See Application*, page 1, lines 29-31. As claimed, this method includes sending a stream of the carbon monoxide-enriched liquid to a stripping column to produce a hydrogen-free liquid carbon monoxide and hydrogen-enriched carbon monoxide gas. *See Application*, page 1, lines 32-35. As claimed, the method includes sending a stream of the hydrogen-free carbon monoxide to a first intermediate level of a distillation column. *See Application*, page 1, lines 36-38. As claimed, the method includes withdrawing a liquid stream, richer in methane compared to the stream feeding to the distillation column, from the bottom of the distillation column. *See Application*, page 2, lines 1 – 3. As claimed, the method includes withdrawing a carbon monoxide-rich stream from a second intermediate point, the second intermediate point being above the first intermediate point. *See Application*, page 2, lines 5-7. As claimed, the method includes withdrawing a stream enriched with nitrogen and optionally hydrogen compared to the stream feeding to the distillation column from the top of the distillation column. *See Application*, page 2, lines 8-11.

B. Claim 10 - DEPENDENT

Claim 10 further limits claim 9. Specifically, claim 10 specifies that the carbon monoxide-rich stream that is withdrawn from the distillation column is a liquid stream. See *Application*, page 2, lines 13-14.

C. Claim 11 - DEPENDENT

Claim 11 further limits claim 9. Specifically, claim 11 specifies that a carbon monoxide cycle cools the top of the distillation column and/or heats the bottom of the distillation column and/or heats the bottom of the stripping column. See *Application*, page 2, lines 15-18.

D. Claim 12 - DEPENDENT

Claim 12 further limits claim 9. Specifically, claim 12 specifies that carbon monoxide is expanded in a turbine. See *Application*, page 2, lines 19-20.

Grounds of Rejection to be Reviewed on Appeal

1. Claims 9-12 stand rejected under 35 U.S.C. § 103 (a) as being unpatentable over Fabian (DE 19541339).

Arguments

Claims 9-13 are not Obvious over Fabian (DE 19541339).

The Applicable Law

“Under §103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented.” KSR Intl. Co. v Teleflex Inc, 550 U.S. ____ (2007), citing *Graham v John Deere*, 383 U.S. 1 (1966)

In this case, a number of elements that are required by independent claim 9 of the instant application are missing from the disclosure provided by Fabian '339, in the specific excerpts presented by the Examiner and elsewhere in Fabian '339.

Such missing elements include the requirement in element f) that the “carbon monoxide-rich stream is withdrawn from a second intermediate point, the second intermediate point being above the first intermediate point.” The liquid carbon dioxide is removed from the (second) rectification column at the top (stream 16), and not at an intermediate point above the first intermediate point (stream 55).

Referencing Final Office Action page 2, the Examiner states that:

“Applicant stated that Fabin '339 does not teach that the carbon monoxide-rich stream is withdrawn from (a) second intermediate point. Also the liquid carbon monoxide is removed from (a) rectification column at the top and not at an intermediate point. The Examiner notes the differences with respect to location of withdrawing (the) carbon monoxide-rich stream and carbon dioxide. However, these differences are not patentably distinct in the absence of unexpected results.”

Applicants respectfully disagree with the Examiner on this point. Element g) of claim 9 of the instant application explicitly requires that “a stream enriched with nitrogen and optionally hydrogen compared to the stream feeding to the distillation column, is withdrawn from the top of the distillation column.” **One skilled in the art of distillation would recognize that Fabian ‘339 teaches removing the nitrogen-rich (i.e. stickstoff-reiche) fraction at the top of the first distillation column (T2)** (“Am Kopf der ersten Rektifizierkolonne T2 wird eine Stickstoff-reiche Fraktion abgezogen, im Entspannungsventil c entspannt und ebenfalls der bereits erwähnten Heizgasschiene beigemischt.“). **Likewise, one skilled in the art of distillation would recognize that Fabian ,339 teaches removing the carbon monoxide fraction (i.e. hochreine kohlenmonoxid) at the top of the second distillation column (T3)** (“Am Kopf der Rektifizierkolonne T3 wird eine hochreine Kohlenmonoxid-Produktfraktion mittels Leitung 16 abgezogen.”) Thus Fabian ‘339 teaches removing the nitrogen-rich fraction at an intermediate step to the removal of the carbon monoxide, in contradistinction with the requirement of claim 9 of the present invention, which requires the carbon monoxide rich stream to be removed at an intermediate point and the nitrogen enriched stream to be removed at the top of the distillation column. The skilled artisan would find that not only does Fabian ‘339 not render the instant invention obvious, but actually teaches away from the instant invention.

Applicants also respectfully disagree with the Examiner’s assertion that one skilled in the art would find it obvious to take the double distillation column arrangement of Fabian ‘339 and reduce it to a single distillation column arrangement based purely on capital cost considerations. One skilled in this art would recognize that it would be very difficult, possibly impossible, to collapse these two rectification columns, with all the intermediate exchanges of heat, into a single column and retain the same product purity. If such a process degeneration were obvious and practical, one would have expected the inventors of *Fabian* ‘339 to have found it with Occam’s razor.

Referencing Final Office Action page 2, the Examiner states that:

“With respect to the number of rectification (columns), the Examiner notes that the language of claim 9, “comprising” does not limit the number of rectification (columns) to only one column.”

Applicants respectfully disagree with the Examiner on this point. While it is clear that the open language of claim 9 does not necessarily limit the number of rectification columns to a single one, it is clear that the stated steps themselves must be considered properly.

For example, element d) does not state that the carbon monoxide stream is sent to ‘a first column’ or ‘at least one’ distillation column, but that it is sent to ‘a’ distillation column. Thus antecedence *requires* that ‘the’ distillation column referenced in elements e) and g) be *the same column as identified in element d)*. Hence, ordinary claim interpretation requires that the “hydrogen-free carbon monoxide” stream is sent to a first intermediate level, a methane richer stream is withdrawn from the bottom, and a nitrogen-enriched stream is removed from the top ... *of the same column*.

Likewise, antecedence requires that the carbon monoxide-rich stream of element f) be withdrawn from a second intermediate point that is above ‘the’ first intermediate point ... *of the same column*. Applicants agree with the Examiner in that the open transition phrase does could allow the possibility of additional distillation columns, but they would have to be operating in parallel and not in series, in order to satisfy the requirements of claim 9 of the instant application.

Hence, for at least these two reasons, Fabian ‘339 fails to teach or suggest the instant invention, thereby rendering this rejection moot.

As claims 10-12 are dependent upon claim 9, the same arguments apply. Accordingly, for all the foregoing reasons, Applicant requests that the Board order the Examiner to withdraw the rejection of claims 9-12.

Conclusion

In view of the above, it is believed that the Examiner's Final Rejection of the pending claim(s) was/were not warranted and must therefore be REVERSED, together with a finding that the pending claim(s) presented with this appeal is/are patentable.

Respectfully submitted,

Date: **August 12, 2008**

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Claims Appendix

Claims 1 – 8 (canceled)

Claim 9 (previously presented): A method for producing carbon monoxide by cryogenic distillation comprising the following steps:

- a) a gas mixture containing carbon monoxide, hydrogen and nitrogen is cooled and partially condensed to produce a cooled and partially condensed gas mixture;
- b) the cooled and partially condensed gas mixture is separated to produce a hydrogen-enriched gas and a carbon monoxide-enriched liquid;
- c) a stream of the carbon monoxide-enriched liquid is sent to a stripping column to produce hydrogen-free liquid carbon monoxide and hydrogen-enriched carbon monoxide gas;
- d) a stream of the hydrogen-free carbon monoxide is sent to a first intermediate level of a distillation column;
- e) a liquid stream, richer in methane compared to the stream feeding to the distillation column, is withdrawn from the bottom of the distillation column;
- f) a carbon monoxide-rich stream is withdrawn from a second intermediate point, the second intermediate point being above the first intermediate point; and
- g) a stream, enriched with nitrogen and optionally hydrogen compared to the stream feeding to the distillation column, is withdrawn from the top of the distillation column.

Claim 10 (previously presented): The method of claim 9, in which the carbon monoxide-rich stream withdrawn from the distillation column is a liquid stream.

Claim 11 (previously presented): The method of claim 9, in which a carbon monoxide cycle cools the top of the distillation column and/or heats the bottom of the distillation column and/or heats the bottom of the stripping column.

Claim 12 (previously presented): The method of claim 9, in which cycle carbon monoxide is expanded in a turbine.

Claim 13 (withdrawn): An installation for producing carbon monoxide by cryogenic distillation comprising:

- a) a heat exchanger for cooling and partially condensing a gas mixture containing carbon monoxide, hydrogen and nitrogen to produce a cooled and partially condensed gas mixture;
- b) a separator for separating the cooled and partially condensed gas mixture to produce a hydrogen-enriched gas and a carbon monoxide-enriched liquid;
- c) means for conveying the cooled and partially condensed gas mixture from the heat exchanger to the separator;
- d) a stripping column and means for conveying at least part of the carbon monoxide-enriched liquid thereto;
- e) means for withdrawing a hydrogen-enriched gas from the top of the stripping column and means for withdrawing a hydrogen-free liquid from the bottom of the stripping column; and
- f) a distillation column, means for sending a stream of the hydrogen-free liquid to a first intermediate point of the distillation column, means for withdrawing a bottom liquid from the distillation column, means for withdrawing an overhead gas (RSD N₂) from the distillation column and means for withdrawing an intermediate fluid at a second intermediate point of the distillation column, the second intermediate point being above the first intermediate point.

Claim 14 (withdrawn): The installation of claim 13, in which the distillation column has a top condenser and/or a bottom reboiler.

Claim 15 (withdrawn): The installation of claim 13, in which the stripping column has a bottom reboiler.

Claim 16 (withdrawn): The installation of claim 13, in which the column (columns) is (are) heated and/or cooled using a carbon monoxide gas cycle.

Evidence Appendix

None.

Related Proceedings Appendix

None.